Biological aspects of homosexuality

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Editor's note

This paper is another of those prepared for a London Medical Group symposium on homosexuality held in October 1979. Dr MacCulloch describes a clinical trial conducted on 73 patients, 30 of whom were selected. Early calculations at the end of the trial confirmed an impression that there were two categories of homosexuals — primary and secondary — the former being those who reported that they had never shown any heterosexual interest. A case history of identical twins is highlighted in the control trial between two kinds of aversion therapy and psychotherapy.

Dr MacCulloch offers evidence of a biochemical aetiology of primary homosexuality and suggests that if this is upheld it will lead to markedly less hostility in the attitudes of the public and professions to homosexuals and to a different view of society by the homosexuals themselves.

Introduction

The origin of my argument that some homosexual behaviour has a biological cause is clinical. In the course of treating 43 unselected patients presenting complaining of homosexual behaviour and of treating a further 30 selected patients in a clinical trial, it was noticed that patients who never had a history of heterosexual interest throughout their lives appeared to do rather less well than those patients who did give a positive heterosexual history. Preliminary calculations at the end of the trial confirmed this impression and the patients are divided into two categories, primary and secondary homosexuals, the former being those cases who, by their own report, had never at any time shown any heterosexual interest. Because the importance of this primary – secondary dichotomy was not appreciated at the beginning of the trial, the random assignation of patients to treatment was made without reference to this factor. Within that trial the small group and sub-group numbers made statistical evaluation difficult but, however, it was possible to combine the total cohort of 30 trial patients and 36 of the series patients for analysis and the association between primary homosexuality and successful outcome at latest follow up was significant (p = <0.001).

During the course of our control trial between two kinds of aversion therapy and psychotherapy we saw a 24 year old man who was one of a pair of identical twins. His twin was exclusively heterosexual. The patient referred himself via his general practitioner

Table 1 *The association between homosexual type (primary and secondary) and success at latest follow up in response to avoidance learning. Series and trial patients are combined*

	Primary	Secondary	Total
Success	5	36	41
Failure	12	10	22
Total	17	46	63

$\chi^2 = 12.21$
$p = <0.001$

because he was finding the strain of maintaining a heterosexual 'front' intolerable.

Sexual history

The patient's first sexual experience at the age of 13 was that of having another boy's naked body held against his at a swimming baths. He was excited by this; on other similar occasions he later came to admire the physique of other boys. He began auto-masturbation and phantasised males of his own age at the age of 17. He also bought physical culture books. At the age of 18 he was picked up by a male in a public convenience but declined to go with him for the purpose of mutual masturbation. Later he regretted this decision and at the age of 23 he met a 35 year old man under similar circumstances and practised intracrural sexual intercourse with pleasure mixed with some anxiety and nervousness. Within weeks he began to make regular homosexual pick-ups and then began to go to another city specifically to make homosexual pick-ups. He did so in order to avoid recognition in his own town. He practised sodomy once at the age of 23 following a heavy intake of alcohol. At the time of the interview he was making homosexual pick-ups once per week and practised intracrural sexual intercourse, kissing and petting. His auto-masturbatory phantasy was of well-built males and various homosexual acts.

He played with girls a good deal as a younger child, preferring their company to that of boys and he did not play games. He was never attracted to females but commenced heterosexual dating at the age of 15 'because it was the thing to do'. He disliked holding hands. Six months prior to presentation he tried kissing and petting but he said, 'I just can't bring myself to put on a normal act. I dislike girls'. (His sister-in-law did not attract him in any sense).

Personal history

The twin birth was uncomplicated and his upbringing unexceptional. He was described by the heterosexual

twin as doing 'girlish type things' as a child. There is a clear difference in their temperaments, the heterosexual twin being more outgoing and aggressive; the latter felt that the patient was more close to their mother and was shown more physical affection.

PERSONALITY

There was evidence of life long self insecure personality abnormality showing sensitive features and at times ideas of reference. The homosexuality was beginning to have a developmental effect. He showed obsessional features also. There was no hint of previous illness and on examination his mental state was normal. His twin was interviewed using the same initial questionnaire and the common parental history was confirmed. The twin was entirely heterosexual and had always been so.

Family history

His father was a foreman concreter and was a strict parent with sensitive personality features. The patient had little or no emotional contact with his father. His mother tended to complain of bodily ailments and during the early years tended to smother the patient. On presentation he was tending to go out in the evenings in order to avoid listening to his mother's health complaints. She was, no doubt, the dominant parent.

TREATMENT

The patient received 24 sessions of anticipatory avoidance[1] followed by 24 sessions of classical conditioning and showed no shift either clinically or by the sexual orientation method.[1]

FOLLOW UP

No change in sexual orientation had occurred at final follow up at 66 weeks post-treatment. His final Kinsey rating was 6.

Discussion

Perhaps the most striking feature of this case was the complete discordance for sexual object choice. The avoidance latencies[1] are extremely irregular and do not show any evidence of learning.

PATIENT 17   AVOIDANCE LATENCIES
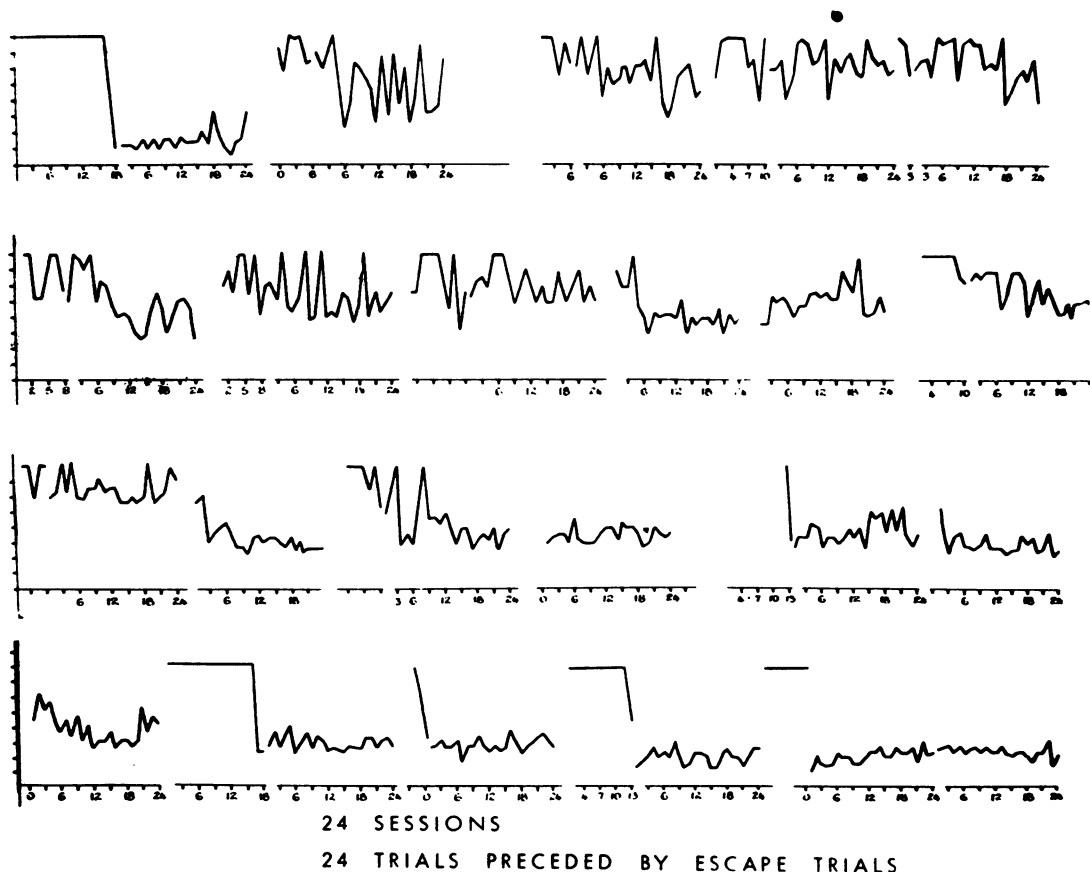
24 SESSIONS

24 TRIALS PRECEDED BY ESCAPE TRIALS

Fig. 1   *Twenty-four sessions of aversion therapy avoidance latencies with 24 trials in each session.*
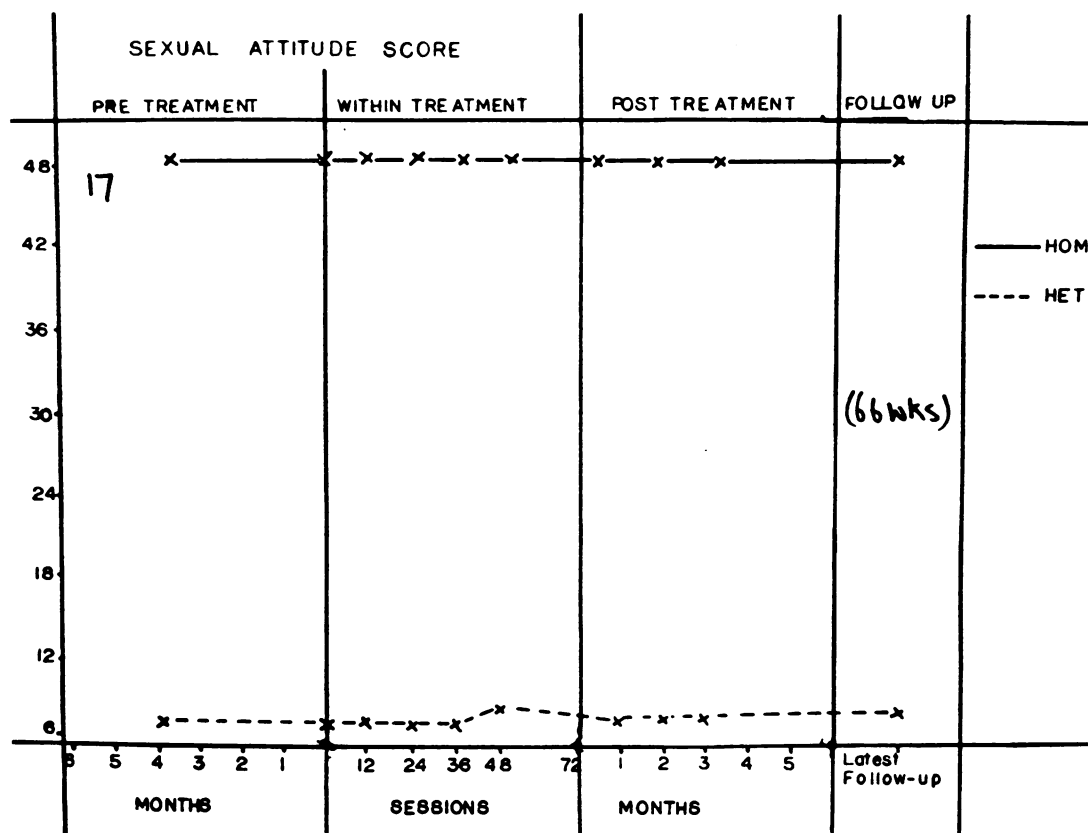
Fig. 2 *The male and female sexual orientation method scores for a monozygotic twin patient 4 months prior to anticipatory avoidance aversion therapy treatment.*

During 72 sessions of treatment, for 3 months after treatment, and at latest follow up 66 weeks post-treatment the scores show no deviation from the pre-treatment levels. I have not seen another case where the sexually orientated method figures totally fail to vary in response to treatment.

We were able to interview both his twin who had a totally discordant early history and later sexual history and his mother who confirmed the histories given by both twins. They had been reared together under apparently normal conditions and their monozygocity was established beyond doubt. The combined evidence of the primaries' resistance to treatment, their markedly different histories from the secondary homosexuals and this pair of discordant monozygotic twins led my colleagues and myself to begin to think about an explanation for homosexual behaviour which would account for learned patterns of homosexual behaviour occurring in relatively normal people and the existence of those in whom there has never been any heterosexual interest or arousal and who appear 'different'. The monozygotic discordant twins appeared to me to disallow a learning theory for the homosexual twin's condition and the heterosexual twin's 'normality' would seem to disallow a genetic theory. It therefore seemed to us that an explanation must be sought which superposes change on an embryo before learning takes place and which does not depend directly on heritable mechanisms. We have previously postulated[1] that there may be hormonally sensitive areas in the human fetal brain which 'are critically susceptible to circulating levels of male and female hormones' (p 169). We therefore turned to the animal literature on sexual dimorphism which is extensive and which by the early 1970s had generally concluded that for the inherent programme of sexual differentiation in both sexes, man was as female.

The presence of androgens during the critical periods of sexual differentiation in animals has been found to organise both genetic males and females to possess masculine reproductive organs,[2] masculinise hepatic steroidogenic enzymes,[3] cause tonic (male pattern) hypothalamic control of gonadotrophic secretion[4-6] and produce male sexual behaviour.[7] At that time it was thought that an absence of either gonad during the critical developmental period allowed the expression of female characteristics which were thought to be inborn.[8] [9]

Experiments by Phoenix et al[10] showed how a genetic female could be masculinised by androgens and,

paradoxically, by oestrogen. They left unsolved the problem of why fetal female brains were not masculinised by normal levels of endogenous fetal oestrogen. This problem was resolved by the critical experiments of Shapiro *et al*[11] who concluded that raised serum progesterone in the female rat neonate could function both to cause feminisation of the brain and as a hormone antagonist to protect the developing female brain from the masculinising effect of both androgen and oestrogen.

To date there is little direct evidence that the brain is sexually dimorphic in humans although there is one striking experiment in humans that is very closely analogous to that of Phoenix *et al*.[10] Wilkins *et al*[12]

describe the occasional incidence of male external genitalia in girls born to mothers treated prenatally with male hormones. These females have almost always been raised as boys and have themselves preferred to continue in this way even when increased ovarian activity at puberty has begun to induce secondary feminine characteristics. This syndrome is suggestive of male brain differentiation in the human female following prenatal exposure to abnormally high levels of male sex hormones that are sufficient to overcome the normal protective effect of progesterone against normally occurring amounts of androgen and is entirely consistent with our theory of female homosexuality.
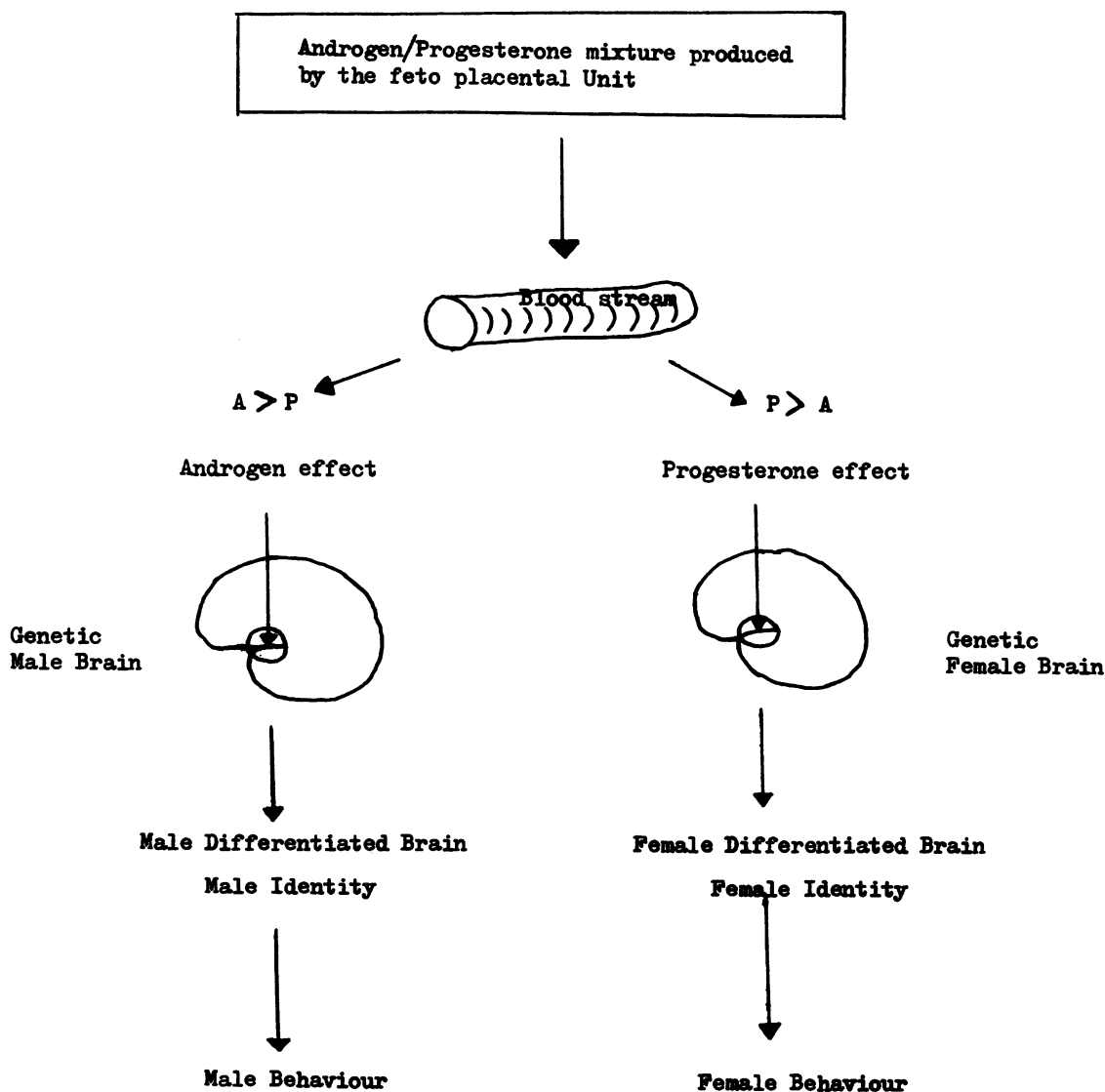

Fig. 3 *Summary of parts of the mechanism responsible for normal sexual dimorphism in man.*
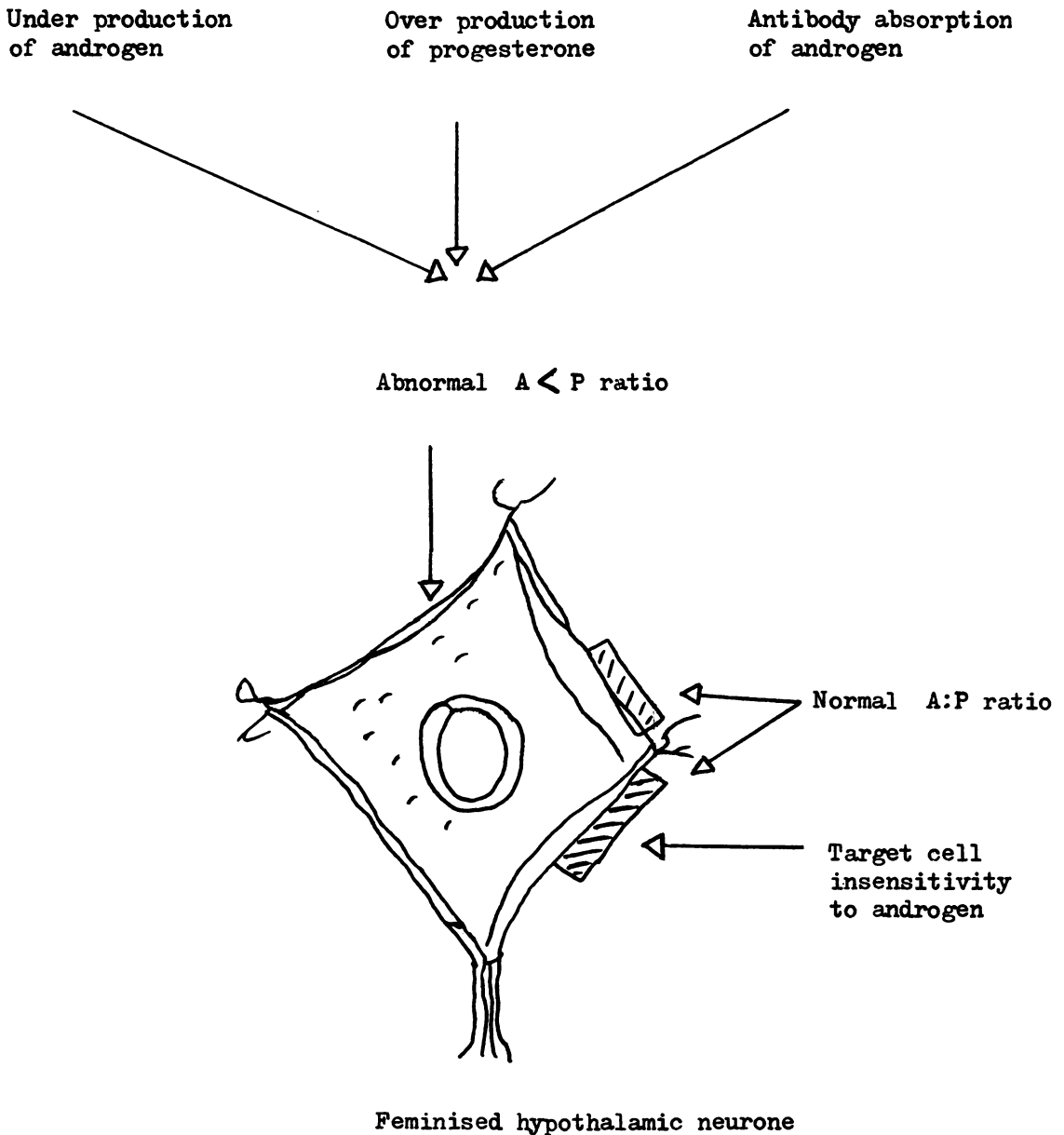
Under production
of androgen

Over production
of progesterone

Antibody absorption
of androgen

Abnormal A $<$ P ratio

Normal A:P ratio

Target cell
insensitivity
to androgen

Feminised hypothalamic neurone

Fig. 4 *Some possible mechanisms which would lead to a female sexual differentiation in a male brain.*

A biochemical theory for the aetiology of male and female homosexuality

The presence of androgens during critical periods *in utero* organises masculinisation of offspring and their absence allows the expression of female characteristics; the limited available evidence in the human male is in support of this concept. Additionally, in animals, brain feminisation itself may in fact be hormonally controlled by the *in utero* conditions. It may be that in the human, hormones control brain differentiation and the direction of subsequent sexual object choice in adult life.

Co-workers have suggested that the behaviour of primary male homosexuals has as its essential cause a female differentiated brain. We see this misdifferentiation as resulting from the absence of an androgen effect in the hypothalamus during the critical period for brain sex differentiation.

As regards female homosexuals the findings of

Shapiro *et al*[11] relating to brain feminisation and to the protection of the brain from the masculinising effect of both androgens and oestrogens by progesterone provides a new theoretical basis for an explanation of primary lesbianism. We suggest that this behaviour arises from a male differentiated brain in a genetic female. As with male homosexuals, we suggest that primary lesbians could comprise aetiologically heterogenous groups consisting of subjects whose foetal hypothalami were insufficiently feminised and/or protected from normal amounts of oestrogen by deficits in progesterone and subjects whose brains were masculinised by abnormal amounts of androgen in the presence of a normal amount of progesterone.

The nature of the *in utero* defect

Bidlingmaier *et al*[13] in a very striking experiment have described how an immune reaction to testosterone in the pregnant rabbit could alter the sexual development of male offsprings. They produced pregnant female rabbits whose serum contained antibodies capable of neutralising the biological activity of testosterone and whose male offsprings were shown to have elevated serum testosterone levels and a development of their reproductive system identical to that in a normal female rabbit. This experiment demonstrates that testosterone antibodies can pass the placental barrier and that developing sex organs can be deprived of the effect of testosterone (despite a feedback-induced increase in absolute testosterone level) leading to changes in morphogenesis similar to testicular atrophy experiments in other species.

Conclusion

Where an identifiable enduring pattern of behaviour is known to arise predominantly from environmental factors, life experience and self regulated behaviour, society at large feels free to take a hostile view if the behaviour in question is one which has been proscribed. In the case of homosexual behaviour there remains much hostility and disapprobation towards homosexuals even amongst the supposedly more enlightened members of society such as doctors, lawyers and judges. It seems clear to me that a biochemical view of the aetiology of primary homosexuality, if upheld, is bound to lead to a marked change in the attitudes of the public and professions to homosexuals and to a different view of society by the homosexuals themselves.

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